<u>CLAIMS:</u>

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent is:

1. A method for real-time multi-pass encoding of a sequence of video frames comprising the steps of:

    a)   continuously collecting information on the statistics and rate-quality characteristics of a sequence of incoming video frames;

    b)   deriving a coding strategy to encode the sequence of incoming video frames based on the information collected; and,

    c)   encoding the incoming frames by the derived coding strategy.

2. The method as claimed in Claim 1, wherein said information collected relates to past, current and future input video frames comprising said sequence.

3. The method as claimed in Claim 2, further including the step of simultaneously feeding said sequence to an input buffer and a first encoder device, said input buffer implementing a processing time delay of sufficient time such that sufficient information may be collected from said input sequence by said first encoder device for deriving said coding strategy.

4. The method as claimed in Claim 3, further including the step of generating coding parameters for instructing a second encoder device to encode said incoming frames according to said derived strategy.

5. The method as claimed in Claim 3, further including the step of calculating a sufficient look ahead window for determining a size of said input buffer and correlating said size to said processing delay.

6. The method as claimed in Claim 3, further including the step of: calculating a dynamic weighted picture complexity defined as a function of motion magnitude and picture quality index.

7. The method as claimed in Claim 5, further including the step of: determining a target bit allocation plan for the video frames so that available bits for all frames in the look ahead window may be used efficiently used.

8. The method as claimed in Claim 5, further including the step of: implementing rate control scheme to prevent underflow or overflow of a decode buffer requirement implemented according to a MPEG-2 standard.

9. The method as claimed in Claim 8, wherein the rate control scheme implements steps for adjusting the target bit allocation to prevent said decode buffer underflow or overflow.

10. The method as claimed in Claim 4, wherein the step c) of encoding the incoming frames includes implementing said second encoder device for receiving said coding parameters, wherein said first encoder device collects direct video frame signal information and intermediate results in various frame encoding stages under same encoding operation conditions as employed by said second encoder device.

11. The method as claimed in Claim 10, wherein said first and second encoder devices operate at the same constant bit rate (CBR).

12. A system for real-time multi-pass encoding of a sequence of video frames comprising:
    a) means for continuously collecting information on the statistics and rate-quality characteristics of a sequence of input frames;
    b) means for deriving a coding strategy to encode the incoming frames based on the information collected; and
    c) an encoder subsystem for encoding the incoming sequence of frames according to the coding strategy.

13. The system as claimed in Claim 12, wherein said information collected relates to past, current and future input video frames comprising said sequence.

14. The system as claimed in Claim 13, wherein said sequence of frames is simultaneously fed to an input buffer means and a first encoder device, said input buffer means implementing a processing time delay of sufficient time such that sufficient information may be collected from said input sequence by said first encoder device for deriving said coding strategy.

15. The system as claimed in Claim 14, wherein said encoder subsystem includes second encoder device, said system further comprising means for generating coding parameters for instructing said second encoder device to encode said incoming frames according to said derived strategy.

16. The system as claimed in Claim 14, further including means for calculating a sufficient look ahead window for determining a size of said input buffer and correlating said size to said processing delay.

17. The system as claimed in Claim 14, further including means for calculating a dynamic weighted picture complexity defined as a function of motion magnitude and picture quality index.

18. The system as claimed in Claim 16, further including means for determining a target bit allocation plan for the video frames so that available bits for all frames in the look ahead window may be used efficiently used.

19. The system as claimed in Claim 16, further including means for implementing rate control scheme to prevent underflow or overflow of a decode buffer requirement implemented according to a MPEG-2 standard, wherein the rate control scheme implements steps for adjusting the target bit allocation to prevent said decode buffer underflow or overflow.

20. The system as claimed in Claim 15, wherein said first encoder device collects direct video frame signal information and intermediate results in various frame encoding stages under same encoding operation conditions as employed by said second encoder device.

21. The system as claimed in Claim 20, wherein said first and second encoder devices operate at the same constant bit rate (CBR).

22. A program storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform method steps for real-time multi-pass encoding of a sequence of video frames, said method steps including steps of:

    a) continuously collecting information on the statistics and rate-quality characteristics of a sequence of incoming video frames;

    b) deriving a coding strategy to encode the sequence of incoming video frames based on the information collected; and,

    c) encoding the incoming frames by the derived coding strategy.